

WHAT IS CLAIMED IS:

1                   1.       A system for monitoring an industrial process, the system  
2 comprising a computer program product, the product comprising;  
3                   a code directed to accessing a process controller;  
4                   a code directed to an input module coupled to code directed to the process  
5 controller, the input module code being adapted to input a plurality of parameters  
6 from a process for manufacture of a substance;  
7                   a code directed to a computer aided process module coupled to the process  
8 controller, the computer aided process module code being adapted to compare at least  
9 two of the plurality of parameters against a predetermined training set of parameters,  
10 and being adapted to determine if the at least two of the plurality of parameters are  
11 within a predetermined range of the training set of parameters; and  
12                   a code directed to an output module coupled to the process controller, the  
13 output module being adapted to output a result based upon the determining step.

1                   2.       The system of claim 1 wherein the substance is selected from a  
2 petroleum product, a chemical product, a food product, a health product, a cleaning  
3 product, a biological product, and other fluid or objects.

1                   3.       The system of claim 1 wherein the plurality of parameters are  
2 selected from an intrinsic element or an extrinsic element of the process.

1                   4.       The system of claim 1 wherein the input module code, the  
2 computer aided process module code, and the output module code are provided in a single  
3 computer software program.

1                   5.       The system of claim 1 wherein the computer aided module code  
2 includes an algorithm selected from PCA, HCA, KNN CV KNN Prd, SIMCA CV,  
3 SIMCA Prd, Canon Prd, Fisher CV, and SCREAM.

1                   6.       The system of claim 1 further comprising a code directed to  
2 normalizing coupled to the process controller, the normalizing code being adapted to  
3 normalize each of the plurality of parameters before input into the computer aided process  
4 module.

1                   7.       The system of claim 1 wherein the training step of parameters are  
2   preprocessed in at least two of the computer aided processes.

1                   8.       The system of claim 1 wherein the result is an affirmative response  
2   or a .negative response, where the response is displayed on a terminal.

1                   9.       The system of claim 1 wherein the computer aided process is  
2   selected from a library comprising a plurality of processes.

1                   10.      The system of claim 9 wherein the plurality of processes includes  
2   at least a comparing process, a contrasting process, and a functional process.

1                   11.      A system for monitoring an industrial process for the manufacture  
2   of materials or objects, the system comprising a computer code product, the product  
3   comprising:

4                   a code directed to an input module, the input module code being adapted to  
5   input a plurality of process parameters from a process for manufacture of a substance  
6   or object;

7                   a code directed to a library module coupled to the input module code, the  
8   library module code including a plurality of computer aided processes, each of the  
9   computer aided processes being capable of determining an output based upon a  
10   predetermined training set of the plurality of process parameters;

11                  a code directed to an output module coupled to the library module code,  
12   the output module code being adapted to output a result based upon the predetermined  
13   training set and the plurality of process parameters; wherein each of the computer  
14   aided processes compares at least two of the plurality of process parameters against a  
15   portion of the training set of parameters and determines if the at least two of the  
16   plurality of process parameters are within a predetermined range of the portion of the  
17   training set of parameters.

1                   12.      A system for monitoring a process, the system comprising a  
2   computer program product, the product comprising:

3                   a code directed to storing a first model in memory;

4                   a code directed to acquiring data from a process;

5 a code directed to applying the first model to the data to identify a first  
6 predicted descriptor characteristic of a state of the process; and  
7 a code directed to consulting a first knowledge based system to provide an  
8 output based upon the first predicted descriptor.

1 13. The product of claim 12 wherein the model is constructed from a  
2 mathematical equation describing a physical law.

1 14. The product of claim 12 further comprising preprocessing the data  
2 prior to applying the model.

1 15. The product of claim 12 wherein the output is communicated to the  
2 process to adjust an operational parameter of the process.

1 16. The product of claim 12 wherein the output is communicated to an  
2 operator to permit monitoring of the state of the process.

1 17. The product of claim 12 wherein the output is resident on a server  
2 and accessible to a user over a network of computers utilizing a browser software  
3 program.

1 18. The product of claim 17 wherein the input is acquired from the  
2 process over a network of computers

1 19. The product of claim 12 wherein the input is acquired from the  
2 process over a network of computers.

1 20. The product of claim 12 wherein the output is communicated over  
2 a network of computers to an associated system, the associated system including at least  
3 one of a legacy system, an e-enterprise system, and a desktop application.

1 21. The product of claim 12 wherein the first knowledge based system  
2 is an expert system.

1 22. The product of claim 12 further comprising:  
2 a code directed to acquiring initial data from a source at a first time;  
3 a code directed to converting the initial data into electronic form;  
4 a code directed to loading the initial data into memory;

5 a code directed to retrieving the initial data from memory;  
6 a code directed to acquiring subsequent data from the source at a second  
7 time;  
8 a code directed to assigning a first descriptor to the initial data and a  
9 second descriptor to the subsequent data;  
10 a code directed to constructing the model based upon the initial data, the  
11 subsequent data, the first descriptor, and the second descriptor; and  
12 a code directed to storing the model in memory.

1 23. The product of claim 22 wherein the model is constructed from at  
2 least one of a univariate statistical technique, a multivariate statistical technique, a time  
3 series analysis, and a neural-based approach.

1 24. The product of claim 22 wherein the model is constructed from one  
2 of a group of different algorithms or models stored in a library.

1 25. The product of claim 22 wherein the source is in communication  
2 with the process, the initial data and the subsequent data reflecting prior operation of the  
3 process.

1 26. The product of claim 22 wherein the source is in communication  
2 with a second process similar to the process, the initial data and the subsequent data  
3 reflecting operation of the second process.

1 27. The product of claim 22 further comprising:  
2 a code directed to constructing a second model;  
3 a code directed to storing the second model in memory;  
4 a code directed to applying the second model to the process data to  
5 identify a second predicted descriptor characteristic of the process data; and  
6 a code directed to consulting the knowledge based system to produce the  
7 output based on the first predicted descriptor and the second predicted descriptor.

1 28. The product of claim 27 wherein the second model is constructed  
2 based upon the initial data, the subsequent data, the first descriptor, and the second  
3 descriptor, such that comparison of the first descriptor and the second descriptor  
4 represents a cross-validation.

1                   29.     The product of claim 27 wherein the second model is constructed  
2 from operation of a second process similar to the process, such that comparison of the  
3 first descriptor to the second descriptor represents an external validation..

1                   30.     The product of claim 27 wherein the knowledge based system is an  
2 expert system.

1                   31.     The product of claim 12 further comprising code configured to  
2 receive key preliminary information and to communicate the key preliminary information  
3 downstream to the code applying the first model, such that the first predicted descriptor  
4 reflects the key preliminary information.

1                   32.     A method for monitoring a process, the method comprising:  
2 storing a first model in a memory;  
3 acquiring data from a process;  
4 applying the first model to the data to identify a first predicted descriptor  
5 characteristic of a state of the process; and  
6 consulting a first knowledge based system to provide an output based upon  
7 the first predicted descriptor.

1                   33.     The method of claim 32 wherein the model is constructed from a  
2 mathematical equation describing a physical law.

1                   34.     The method of claim 32 further comprising preprocessing the data  
2 prior to applying the model.

1                   35.     The method of claim 32 wherein the output is communicated to the  
2 process to adjust an operational parameter of the process.

1                   36.     The method of claim 32 wherein the output is communicated to a  
2 human operator to permit monitoring of the process.

1                   37.     The method of claim 32 wherein the output is resident on a server  
2 and accessible to a user through a browser software program.

1                   38.     The product of claim 37 wherein the input is acquired from the  
2 process over a network of computers

1           39.     The product of claim 32 wherein the input is acquired from the  
2 process over a network of computers..

1           40.     The method of claim 32 wherein the output is communicated over  
2 a network to an associated system, the associated system including at least one of a legacy  
3 system, an e-enterprise system, and a desktop application.

1           41.     The method of claim 32 wherein the first knowledge based system  
2 is an expert system.

1           42.     The method of claim 32 further comprising:  
2 acquiring initial data from a source at a first time;  
3 converting the initial data into electronic form;  
4 loading the initial data into memory;  
5 retrieving the initial data from memory;  
6 acquiring subsequent data from the source at a second time;  
7 assigning a first descriptor to the initial data and a second descriptor to the  
8 subsequent data;  
9 constructing the model based upon the initial data, the subsequent data, the  
10 first descriptor, and the second descriptor; and  
11 storing the model in memory.

1           43.     The method of claim 42 wherein the model is constructed from one  
2 of a univariate statistical technique, a multivariate statistical technique, and a time series  
3 analysis.

1           44.     The method of claim 42 wherein the model is constructed from one  
2 of a group of different algorithms stored in a library.

1           45.     The method of claim 42 wherein the source is in communication  
2 with the process, the initial data and the subsequent data reflecting prior operation of the  
3 process.

1           46.     The method of claim 42 wherein the source is in communication  
2 with a second process similar to the process, the initial data and the subsequent data  
3 reflecting operation of the second process.

47. The method of claim 42 further comprising:  
constructing a second model;  
storing the second model in memory;  
applying the second model to the process data to identify a second  
predicted descriptor characteristic of the process data; and  
consulting the first knowledge based system to produce the output based  
upon the first predicted descriptor and the second predicted descriptor.

48. The method of claim 47 wherein the second model is constructed based upon the initial data, the subsequent data, the first descriptor, and the second descriptor, such that comparison of the first descriptor and the second descriptor represents a cross-validation.

49. The method of claim 47 wherein the second model is constructed from operation of a second process similar to the process, such that comparison of the first descriptor to the second descriptor represents an external validation..

50. The method of claim 47 wherein the knowledge based system is an expert system.

51. The method claim 32 further comprising receiving key preliminary information and communicating the key preliminary information downstream to the first model, such that the first predicted descriptor reflects the key preliminary information.

52. A system for controlling a process, the system comprising:  
a first field mounted device in communication with a process and  
configured to produce a first input; and  
process manager receiving the first input and configured to apply a first  
model to the first input to identify a first predicted descriptor characteristic of a state of  
the process, and configured to consult a first knowledge based system to provide an  
output based upon the first predicted descriptor.

53. The system of claim 52 wherein the process manager is a server in communication with the first field mounted device via a computer network.

